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(54) **Power-driven toothbrush holder**

(57) A power-driven toothbrush holder comprises a housing 3, a power-driven rotary drive member capable of receiving a detachable toothbrush 11 and which, in operation, causes the toothbrush to move in a closed loop, a reversing switch 1 for reversing the direction of movement of the drive member, and a hand-grip portion 2 mounted on the housing. The hand-grip portion 2 is movable relative to the housing 3 and operatively connected to the reversing switch 1, and the arrangement is such that, in operation, movement of the hand-grip portion 2 relative to the housing occurs in response to certain changes in magnitude and/or direction of the force with which the toothbrush is applied to parts of the mouth.

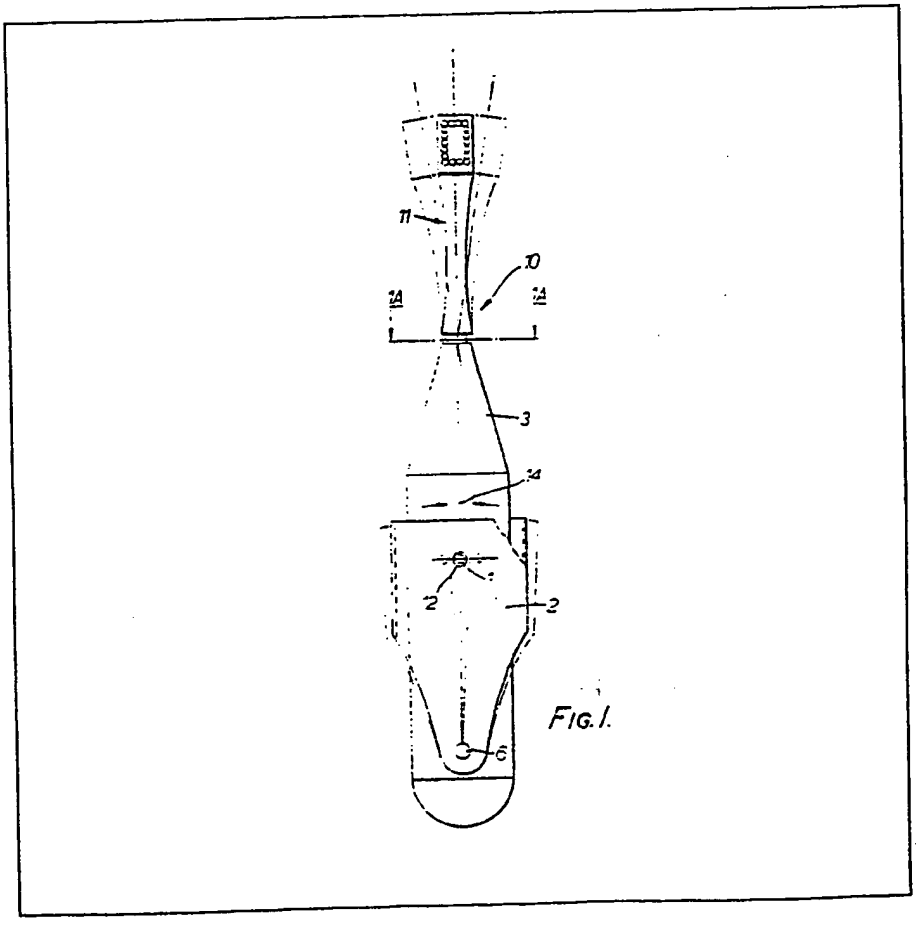

FIG. 1.

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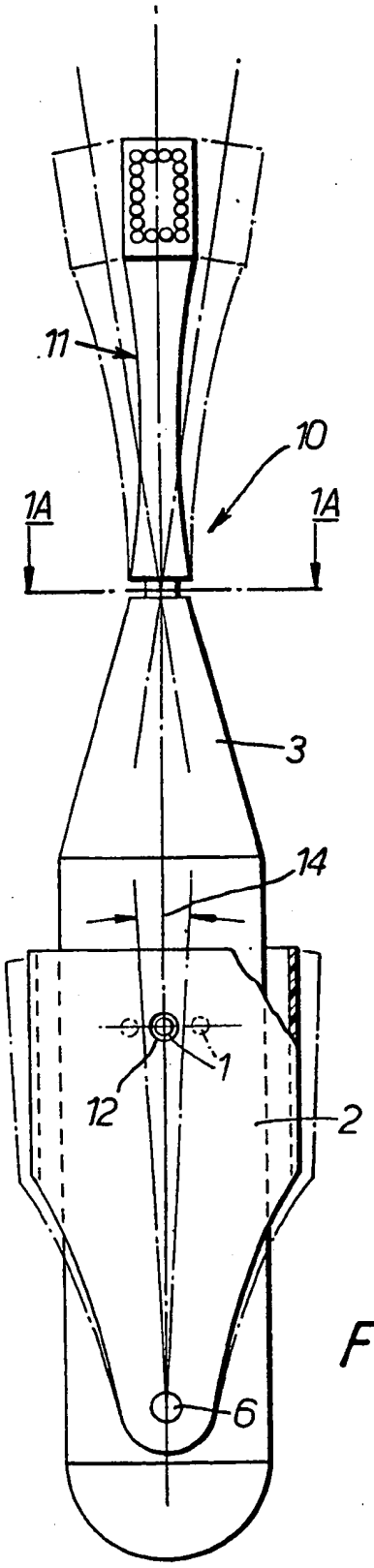

FIG. 1.

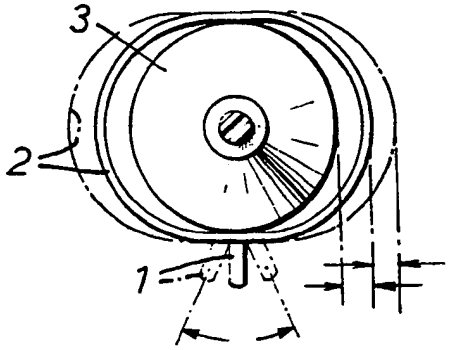

FIG. 1A.

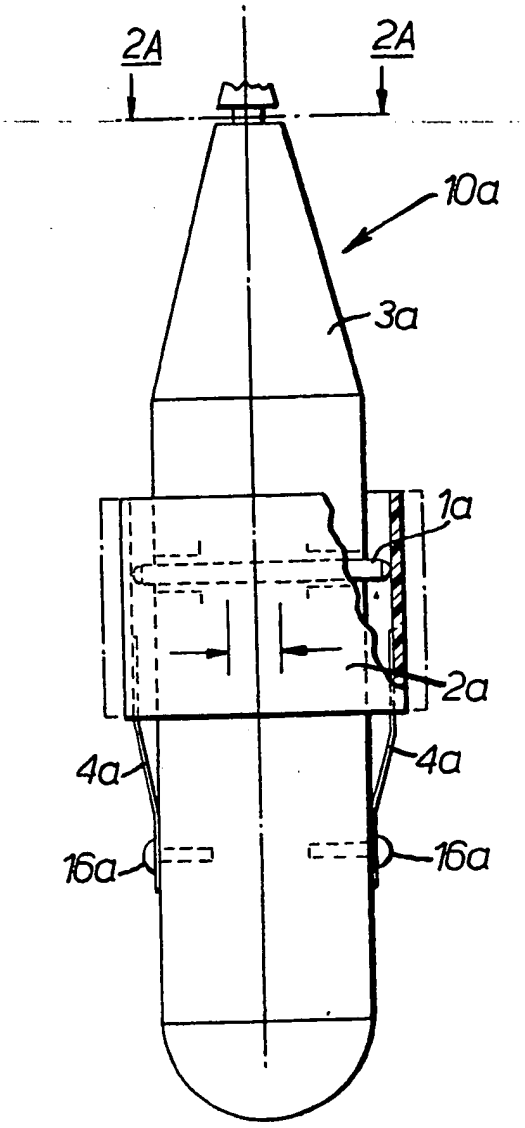

FIG.2.

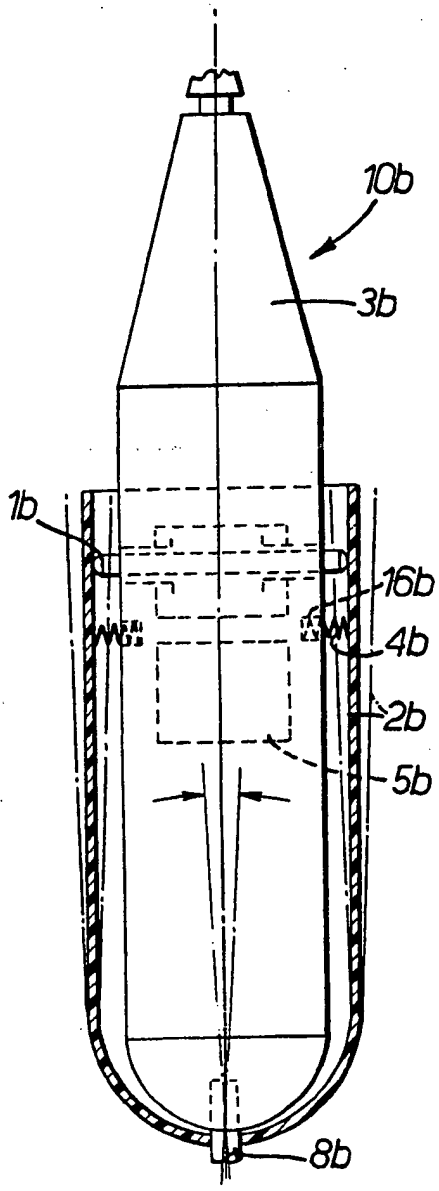

FIG.3.

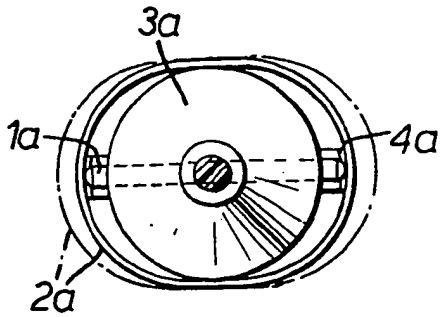

FIG.2A.

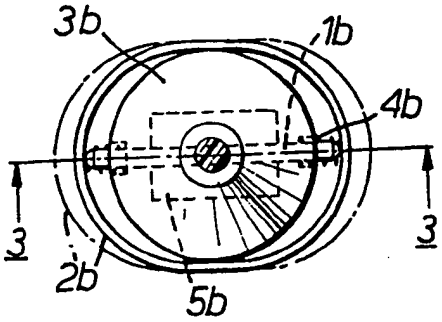

FIG.3A.

SPECIFICATION

Power-driven toothbrush holder

This invention relates to mechanically or electrically operated toothbrush holders. My co-pending Application No. 10436/77 (corresponding to German Offenlegungsschrift No. 2 607 820) describes a power-driven toothbrush holder incorporated in a housing, which is characterized in that situated at the rotating output end is an eccentrically or concentrically mounted disk, in which one or more funnel-shaped openings or recesses are eccentrically situated, serving as the end bearing for receiving a drive shaft whose outer support with ball end arrangement or resilient bearing is located in the toothbrush housing and whose end is formed directly as a holder for a push-in brush. By the arrangement of the drive of this toothbrush, it is possible to carry out a rotary to elliptical cleaning movement desired in dental medicine.

In this connection, however, there arises the necessity to vary the rotational direction of the cleaning movement, depending on the application of the brush to the dentition. This occurs according to a preferred design of the earlier patent application by the arrangement of a reversing switch by means of which the rotational direction of the rotating output disk may be varied.

Although according to the copending Application such reversing switch *per se* provides for a satisfactory handling of the switching of the toothbrush, this solution may seem cumbersome to some users to the extent that they must perform a switching operation after the cleaning of every tooth section on the inside and outside of the dentition. For the non-mechanically inclined user or for children, problems could result therefrom.

This also holds true with respect to a further preferred embodiment of the earlier patent application, according to which the reversing switch is formed in such a manner that it may be actuated by lip or pressure. This too, requires a certain dexterity of the user. Furthermore, the formation of such a switch is visually troublesome and upon utilization also annoying to the user.

German Offenlegungsschrift No. 2 363 364 describes an electric toothbrush whose operation is initiated by the pressure of the toothbrush on the teeth. Entirely aside from the fact that this does not cause a "reversal" of the rotational direction of the brush, the actuation is not afforded by the variable pressure forces exerted by the user.

The present invention provides a power-driven toothbrush holder which comprises a housing, a power-driven rotary drive member capable of receiving a detachable toothbrush and which, in operation, causes the toothbrush to move in a closed loop, means for reversing the direction of movement of the drive member, and a hand-grip portion mounted on the housing and movable relative thereto between two positions, the hand-grip portion being operatively connected to the reversing means, in one position to cause the drive member to move in drive member to move in the opposite sense.

The toothbrush holder may be one that includes a rotary drive mechanism comprising a rotatable member such as an eccentrically or concentrically mounted disc, on which one end of the rotary drive member is mounted eccentrically with respect to the axis of rotation of the rotatable member, the rotary drive member extending through, and being pivotally supported at, the housing. In such a device, the rotary drive member is preferably supported by means of a ball-end arrangement or by a bearing of a resilient material. The rotatable member preferably has one or more funnel-shaped apertures or recesses for receiving the end of the rotary drive member.

The arrangement of the toothbrush holder may be such that, in operation, movement of the hand-grip portion between the said two positions occurs in response to certain changes in the magnitude and/or direction of the force with which the toothbrush is applied to parts of the mouth. It is also possible, however, for the toothbrush holder to be arranged so that, in operation, movement of the hand-grip portion between the two positions is effected manually by the user.

The hand-grip portion which may be tiltable, slidable or pivotable relative to the housing is preferably pivotally mounted on the housing and may be connected thereto by means of one or more springs, for example leaf springs or by other means such as slidable connecting rods or joints.

In one form of device the hand-grip portion comprises an annular sleeve that covers at least part of the housing and which may be so mounted that it can be moved laterally with respect to the housing to actuate the reversing means.

In another form of device, the hand-grip portion comprises an outer casing that covers at least a major portion of the housing and which may be pivotally mounted at the end of the housing remote from the rotary drive member.

The reversing means may, for example, comprise a toggle switch which engages an aperture or recess in the hand-grip portion or it may comprise a slid switch having two arms that extend through opposite sides of the housing and abut the inner surface of the hand-grip portion.

Preferably the hand-grip portion can be moved with respect to the housing to a third, intermediate position in which the toothbrush holder is isolated from the source of power. In such a case the hand-grip portion is preferably biased toward th intermediate position by means of one or more springs such as leaf springs or coil springs, which springs may b the springs by which the hand-grip portion and the housing are connected.

Th toothbrush holder advantageously includes a gravity operated reversing switch in addition to the reversing means, by means of which the motion of the drive memb r may be varied in response to changes in the angle at which the toothbrush holder is held.

The present invention also provides a combination comprising a toothbrush holder according to the invention and a detachably m unt d t othbrush.

Several forms of toothbrush holder according to

th present invention will now be described by way f example, with referenc to the accompanying drawings, in which:

Figure 1 is a side elevational view of one form of power-operated toothbrush;

Figure 1A is a cross-sectional view taken along the line 1A-1A of Figure 1;

Figure 2 is a side elevational view of a second form of toothbrush;

Figure 2A is a cross-sectional view taken along the line 2A-2A of Figure 2;

Figure 3 is a cross-sectional view of a third form of toothbrush taken along the line 3-3 of Figure 3A; and

Figure 3A is a top plan view of the third form of toothbrush shown in Figure 3.

Referring to the accompanying drawings, Figures 1 and 1A show a power toothbrush 10 having a movable yoke-shaped hand-grip portion 2 mounted upon housing 3. Figures 2 and 2A have a shorter sleeve-shaped movable hand-grip portion 2*a* mounted upon housing section 3*a*. Figures 3 and 3A have a casing shaped hand-grip portion 2*b* nearly completely enclosing housing 3*b*. The movement of hand-grip portion 2, 2*a* or 2*b* relative to housing 3, 3*a* or 3*b* when the brush is applied to the teeth, depending on the position of the applied brush, actuates reversing switch 1, 1*a*, or 1*b*. Reversing switch 1, 1*a* or 1*b* is constructed and arranged so that the direction of rotation of the power toothbrush 11 synchronizes with the particular positions at which the brush is applied to the teeth to provide desirable brushing action.

In Figure 1, hand-grip portion 2 is movably mounted relative to housing 3 on pivots 6 near the bottom of housing 3. Hand-grip portion 2 engages toggle switch lever 1 at slot 12 whose centre line 14 has an angular movement relative to pivot 6 of approximately 6°. Figure 2 shows how the 6° angular movement of hand-grip portion 2 is converted into a lateral 40° movement of toggle switch lever 1 to actuate the switch to provide reversing movement in two different directions. Figures 2 and 2A show sleeve-shaped hand-grip portion 2*a* mounted on leaf springs 4*a* whose lower ends are secured to housing 3 by mounting screws 16*a*. Lateral movement of hand-grip portion 2*a* from the neutral solid line position to the phantom outline positions shows the full range of movement of switch 1*a* to accomplish reversing movement in two different directions. Switch 1*a* is turned off in the central solid line position. It is also possible, howver, to provide a separate switch for turning brush 10*a* on an off.

Figures 3 and 3A show a casing-shaped movable hand-grip portion 2*b* which pivots about flexible mounting element 8*b* mounted at the bottom of housing 3*b*. Hand-grip portion 2*b* may acc rdingly rock 6° relative to housing 3*b* to actuate switch 1*b* in a manner similar to switch 1*a* in Figure 2. Figure 3 also shows a further reversing switch 5*b*, actuated for example by gravity. The two different switch s provide a differ nt switching actuation f r the upp r and lower jaws to suit the different dir ctions f power brushing respectively requir d. Hand grip-portion 2*b* is biased in the neutral position by a pair of coil springs 4*b* inserted in sockets 16*b* in the sides of housing 3*b* acting in the direction of movement of switch 1*b*.

The transition from housing to handle is s aled preferably in a manner known *per se*, e.g. by bellows, (not shown) in order to prevent the intrusion of water or tooth paste.

The operating mechanism of the novel power toothbrush is explained again in detail as follows:

Upon application of pressure by the brush on the teeth, the reversing switch is actuated by the shifting of the position of the handle with respect to the housing section; the brush is set into a rotary motion, e.g. circular, or a flattened rotary motion e.g. an elliptical motion by means of the arrangement described in co-pending Application No. 10436/77 (DOS No. 2 607 820). With a change of the brush position by the application on another tooth section, the position of the handle section necessarily changes with respect to the housing, whereby the reversing switch is actuated respectively and the rotational direction is changed accordingly should it be required, depending on the position of the brush. In this manner, the correct rotational direction of the brush, i.e. from the gums out, is automatically afforded.

As for the rest of the operation, that of the embodiments described in Offenlegungsschrift No. 2 607 820, is applicable to the toothbrush holder according to the present invention.

CLAIMS

1. A power-driven toothbrush holder which comprises a housing, a power-driven rotary drive member capable of receiving a detachable toothbrush and which, in operation, causes the toothbrush to move in a closed loop, means for reversing the direction of movement of the drive member, and a hand-grip portion mounted on the housing and movable relative thereto between two positions, the hand-grip portion being operatively connected to the reversing means, in one position to cause the drive member to move in one sense and in the other position to cause the drive member to move in the opposite sense.

2. A toothbrush holder as claimed in claim 1, which includes a rotary drive mechanism comprising a rotatable member on which one end of the rotary drive member is mounted eccentrically with respect to the axis of rotation of the rotatable member, the rotary drive member extending through, and being pivotally supported at, the housing.

3. A toothbrush holder as claimed in claim 2, wherein the rotary drive member is pivotally supported by means of a ball-end arrangement or by a bearing of a resilient material.

4. A t othbrush holder as claimed in claim 2 or claim 3, wherein the rotatable member has one or more funnel-shaped apertur s or recess s for receiving the end of the rotary driv memb r.

5. A power-driven to thbrush holder as claimed in any one of claims 1 to 4, wherein the arrangement is such that, in operation, movement of the hand-grip portion between the said two positions occurs

in response to certain changes in magnitude and/or direction of the force with which the toothbrush is applied to parts of the mouth.

6. A toothbrush holder as claimed in any one of claims 1 to 5, wherein the hand-grip portion is pivotally mounted on the housing.

7. A toothbrush holder as claimed in any one of claims 1 to 6 wherein the hand-grip portion is connected to the housing by means of one or more springs.

8. A toothbrush holder as claimed in claim 7, wherein the hand-grip portion is connected to the housing by means of one or more leaf springs.

9. A toothbrush holder as claimed in any one of claims 1 to 8, wherein the hand-grip portion comprises an annular sleeve that covers at least part of the housing.

10. A toothbrush holder as claimed in claim 9, wherein the annular sleeve is so mounted that it can be moved laterally with respect to the housing to actuate the reversing means.

11. A toothbrush holder as claimed in any one of claims 1 to 8, wherein the hand-grip portion comprises an outer casing that covers at least a major portion of the housing.

12. A toothbrush holder as claimed in claim 11, wherein the outer casing is pivotally mounted on the housing at the end of the housing remote from the rotary drive member.

13. A toothbrush holder as claimed in any one of claimes 1 to 12, wherein the reversing means comprises a toggle switch which engages an aperture or recess in the hand-grip portion.

14. A toothbrush holder as claimed in any one of claims 1 to 13, wherein the reversing means comprises a slide switch having two arms that extend through opposite sides of the housing and abut the inner surface of the hand grip portion.

15. A toothbrush holder as claimed in any one of claims 1 to 14, wherein the hand-grip portion can be moved with respect to the housing to an intermediate position in which the toothbrush holder is isolated from the source of power.

16. A toothbrush holder as claimed in claim 15, wherein the hand-grip portion is biased toward the intermediate position by means of one or more springs.

17. A toothbrush holder as claimed in claim 16, wherein the hand-grip portion is biased toward the intermediate position by means of one or more leaf springs or coil springs.

18. A toothbrush holder as claimed in any one of claims 1 to 17, which includes a gravity-operated reversing switch in addition to the reversing means.

19. A power-driven toothbrush holder substantially as hereinbefore described with reference to, and as shown in Figures 1 and 1A, Figures 2 and 2A or Figures 3 and 2A of the accompanying drawings.

20. A toothbrush holder as claimed in any one of claims 1 to 19, in combination with a detachable toothbrush.

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